



Standard Specification for Projectiles Used in the Sport of Paintball¹

This standard is issued under the fixed designation F1979; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

INTRODUCTION

This specification sets forth a set of guidelines and testing procedures for the manufacturing of common calibers and types of paintball. The goal is to provide paintball manufacturers with a specification that promotes safety in the sport of paintball.

1. Scope

1.1 This specification establishes testing procedures and critical characteristics for projectiles, which define whether they are suitable for use in the sport of paintball. Furthermore, the specification establishes minimum warning and package labeling requirements to help ensure that the paintballs are used in a safe manner and that the risk of injury is reduced.

1.2 This specification does not cover non-recreational paintballs, for example, those used by law enforcement, scientific, military, or theatrical entities.

1.3 The values stated in SI units are to be regarded as the standard. The values given in parentheses are for information only.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

- 2.1 *ASTM Standards:*²
F2272 Specification for Paintball Markers

¹ This specification is under the jurisdiction of ASTM Committee F08 on Sports Equipment, Playing Surfaces, and Facilities and is the direct responsibility of Subcommittee F08.24 on Paintball and Equipment.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *caliber, n*—the term used to refer to the size of a paintball projectile. Related to the measurement of the diameter of the paintball.

3.1.2 *cubic centimeter, n*—commonly used unit of volume extending the derived SI-unit cubic meter and corresponding to the volume of a cube measuring $1 \times 1 \times 1$ cm.

3.1.2.1 *Discussion*—The mass of one cubic centimeter of water is approximately equal to 1 g.

3.1.3 *fill material, n*—liquid inside of a paintball.

3.1.4 *paintball, n*—a projectile designed to be expelled from a paintball marker meeting the requirements of Specification **F2272**.

3.1.4.1 *spherical paintball, n*—a round projectile, with a diameter and weight as defined in **Table 1**, comprised of a shell and a fill material, and designed to be expelled from a paintball marker.

3.1.4.2 *shaped paintball, n*—non-spherical cylindrical shaped projectile with a hemispherical front surface, and a diameter, length, and weight as defined in **Table 2**, comprised of a shell and a fill material, and designed to be expelled from a paintball marker most commonly with a magazine style feed.

3.1.5 *paintball marker, n*—device specifically designed to discharge paintballs which conforms to Specification **F2272**.

3.1.6 *shell*—rigid to semi-rigid frangible material (generally of gelatin) that encapsulates or contains the fill material of a projectile used in the sport of paintball.

4. General Requirements

4.1 *pH of Fill Material*—The pH of the fill material used in all paintballs shall measure between 4.0 and 8.0 as measured using a 10 % solution of the fill in distilled water. Measurements shall be made using a properly calibrated pH meter. See **Fig. 1** for the pH scale and pH levels for some common items.

TABLE 1 Calibers of Spherical Paintballs with Minimum and Maximum Diameter and Maximum Weight

	68 Caliber 18 mm	43 Caliber 11 mm	50 Caliber 13 mm	55 Caliber 14 mm	62 Caliber 16 mm
Min (mm) Diameter	16.5	10.43	12.13	13.34	15
Max (mm) Diameter	18	11.39	13.24	14.56	16.42
Min (in.) Diameter	0.65	0.41	0.47	0.52	0.59
Max (in.) Diameter	0.709	0.448	0.521	0.573	0.646
Weight (g) Maximum	3.5	0.9	1.4	1.7	2.5
Weight (oz) Maximum	0.123	0.032	0.049	0.06	0.088

TABLE 2 Calibers of Shaped Paintballs with Minimum and Maximum Diameter, Length and Maximum Weight

	68 Caliber 18 mm	43 Caliber 11 mm	50 Caliber 13 mm	55 Caliber 14 mm	62 Caliber 16 mm
Min (mm) Diameter	16.5	10.43	12.13	13.34	15
Max (mm) Diameter	18	11.39	13.24	14.56	16.42
Min (in.) Diameter	0.65	0.41	0.47	0.52	0.59
Max (in.) Diameter	0.709	0.448	0.521	0.573	0.646
Min (in.) Length	0.65	0.41	0.47	0.52	0.59
Max (in.) Length	0.709	0.448	0.521	0.573	0.646
Weight (g) Maximum	3.5	0.9	1.4	1.7	2.5
Weight (oz) Maximum	0.123	0.032	0.049	0.06	0.088

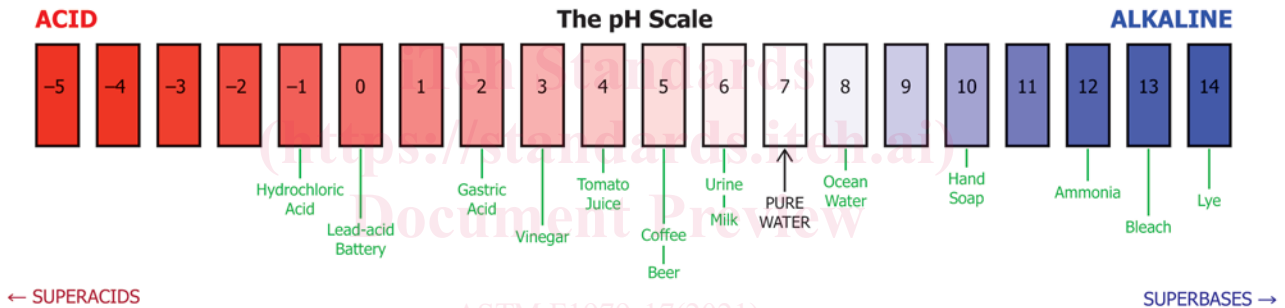


FIG. 1 The pH Scale

4.2 *Paintball Fill Compatibility With Polycarbonate*—When tested in accordance with Section 5, no more than one of the three polycarbonate tensile bars exposed to the fill material shall develop a visible crack that is greater than 6.5 mm (0.256 in.) in length.

4.3 *Maximum Weight*—A paintball shall not weigh more than as defined in Table 1 and Table 2 based on the caliber and type of the paintball.

4.4 *Fill Color Limitations*—A paintball shall not contain fill material with a color mimicking that of human blood.

4.5 *Diameter of a Spherical Paintball*—The diameter of a spherical paintball shall be measured around both the polar axis and seam; both measurements shall be within the minimum and maximum range as defined in Table 1, based on the caliber of the paintball.

4.6 *Diameter of Shaped Paintball*—The diameter of a shaped paintball as measured around the largest section of the

cylinder of the sample shall measure within the minimum and maximum range as defined in Table 2 based on the caliber of the shaped paintball.

4.7 *Length of Shaped Paintball*—The length of the shaped paintball as measured along the overall length of the object shall measure within the minimum and maximum range as defined in Table 2 based on the caliber of the shaped paintball.

4.8 *Impact Breakage*—The impact breakage of the paintball shall be tested in accordance with Section 6. All ten of the paintballs that impact the target shall break upon impact.

4.9 *Environmental Safety*—Paintballs shall not contain environmentally hazardous or toxic substances as defined in CERCLA³ Regulations 40CFR302.4; SARA Toxic Chemical List⁴ Section 313; Clean Air Act⁵, Section 112B; and RCRA Regulations⁶ 40FR261.24 through 40CFR261.33.

TEST METHODS

5. Paintball Compatibility with Polycarbonate

5.1 *Scope*—This test method is intended to determine the compatibility of the paintball fill with polycarbonate, the plastic material currently universally used for protective eyewear lenses in paintball.

5.2 *Summary of Test Method*—This test method involves bending polycarbonate tensile bars in a test fixture while these bars are exposed to the paintball fill material and observing how these tensile bars react to the fill. A control test is also conducted using tap water in place of the paintball fill material.

5.3 *Significance and Use*—This test method provides a means to help determine the suitability of specific paintball fill material for use in the sport of paintball. This test method provides a relative indicator of the reaction that a polycarbonate lens would have to the paintball fill material being tested.

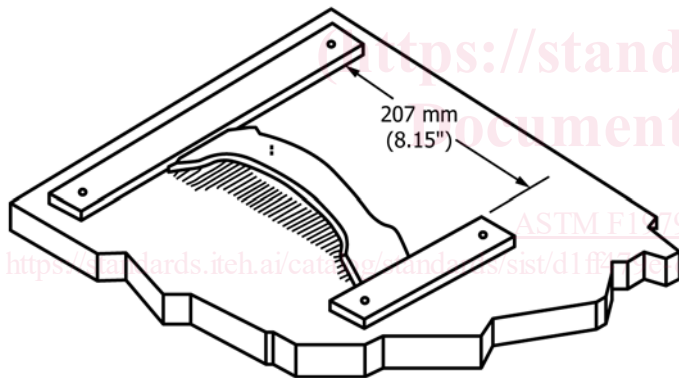


FIG. 2 Tensile Bar Shown Without Wrapping

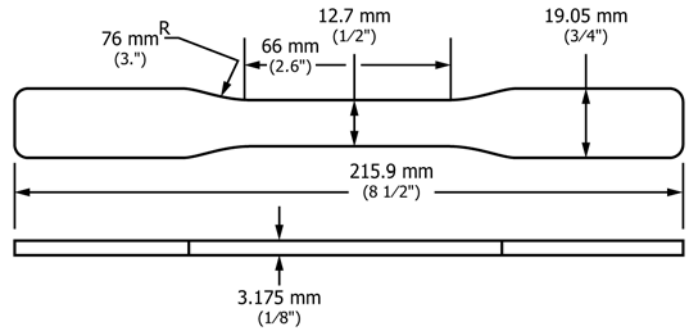


FIG. 3 Tensile Bar

5.4 *Apparatus*—This test method shall be conducted using a test fixture as shown in Fig. 2. The tensile bars⁷ used in the test shall be molded of clear 121 grade Lexan⁸, polycarbonate (Fig. 3).

5.5 Procedure:

5.5.1 Test 3 separate tensile bars for each type of paint being tested. Test a total of 2 tensile bars in the control test using tap water.

5.5.2 Place the fill from 4 paintballs of the tested paint into a polyethylene bag, (the zip-lock variety works well), along with one tensile bar. Place 15 mL (1/2 oz) of tap water, along with one tensile bar into each of the two control sample polyethylene bags. Wrap each bag around the bar so that the fill or water is in contact with the center of the bar, and seal the bag to prevent fill leakage or evaporation.

5.5.3 Bend the bagged tensile bars between the two stops on the test fixture (Fig. 2), which induces a 1.0 % strain or approximately 175.75 k/cm² (2500 psi). Store the bent tensile bars in the test fixture at room temperature 23 ± 2°C (73 ± 3.5°F) for 7 days. During the entire 7-day period, the paintball fill material shall be in contact with the center of the tensile bars. Inverting the test fixture is one method of ensuring this contact. Wrapping the bag snugly around the tensile bars is another proven method.

5.5.4 After 7 days, remove the tensile bars from the test fixture and rinse with clean tap water. Dry the tensile bars and inspect for cracks.

5.6 *Report*—Inspect the tensile bars for cracks by holding the bars vertically facing either direct sunlight or a bright light source. Tilt the bars slightly to highlight any cracks. Record and report the length of the longest crack on each tensile bar. If either of the tensile bars used in the control test exhibit a crack of 3 mm (0.112 in.) in length, and cracks longer than 6.5 mm have also been found in two of the three tensile bars exposed to the fill material, the test may be considered invalid and performed again using a different batch of tensile bars.

⁷ The sole source of supply of the apparatus known to the committee at this time is Hi Tech Mold and Tool Inc., 1520 East St., Pittsfield, MA 01201. If you are aware of alternative suppliers, please provide this information to ASTM International Headquarters. Your comments will receive careful consideration at a meeting of the responsible technical committee,¹ which you may attend.

⁸ Lexan is a trademark of GE Plastics.

³ U.S. Environmental Protection Agency, “Designation of Hazardous Substances List of Hazardous Substances and Reportable Quantities,” *Comprehensive Environmental Response Compensation and Liabilities Act*, Bureau of Federal Affairs, 40CFR302.4, April 4, 1985.

⁴ U.S. Environmental Protection Agency, “Superfund Amendment and Reauthorization Act,” *Environmental Protection Agency Regulation*, Bureau of Federal Affairs, Title III, 1986.

⁵ U.S. Environmental Protection Agency, “National Emission Standards for Air Pollutants List of Hazardous Air Pollutants,” *Clean Air Act*, Bureau of Federal Affairs, Section 112B, 1967.

⁶ U.S. Environmental Protection Agency, “Definition of Characteristic and Listed Hazardous Waste, Identification and Listing of Hazardous Waste,” *Resource Conservation and Recovery Act*, Bureau of Federal Affairs, 40CFR261, May 19, 1980.